Autobiographical Memory Specificity and Non-Suicidal Self-Injury in Borderline Personality Disorder

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Abstract

It has been suggested that patients diagnosed with borderline personality disorder (BPD) use a variety of maladaptive affect-regulation strategies, including non-suicidal self-injury (NSSI). Another, cognitive manner considered to regulate negative affect, is overgeneral memory (OGM). OGM refers to the tendency to recall categories of events, rather than specific episodes. OGM is frequently observed in depressed and traumatised patients. Contrary to the expectations, patients with BPD only inconsistently show OGM. This study investigated how NSSI and OGM relate to each other in BPD patients. Based on earlier findings (Startup et al., 2001), we hypothesized that NSSI and OGM would be inversely related. Fifty three BPD patients completed the Structured Clinical Interview for DSM-IV Disorders, the Autobiographical Memory Test to assess OGM, and the Self-Injury Questionnaire – Treatment Related (SIQ-TR) to assess NSSI. We found no significant differences in OGM between patients with and without NSSI. However, we found that participants who used more NSSI methods showed less OGM, but this association disappeared when we controlled for age. We propose a balance-model of affect-regulation as one possible explanation for the negative relationship between these two affect-regulation strategies.

Keywords: borderline personality disorder, overgeneral memory, non-suicidal self-injury, affect-regulation

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Borderline personality disorder (BPD) is a severe mental illness, associated with high mortality rates (e.g., Paris & Zweig-Frank, 2001) and frequent use of mental health resources (e.g., Bender et al., 2001; Zanarini, Frankenburg, Khera, & Bleichmar, 2001). General prevalence is rather high – estimates range from 0.4% to 5.9% in the general population, and from 15% to 25% in residential psychiatric health care (Torgersen, Kringlen, & Cramer, 2001; Grant et al., 2008; Gunderson, in Gunderson, 2009). Besides disturbed relatedness and behavioural dysregulation, BPD is characterised by affective dysregulation (Sanislow et al., 2002).

It has been suggested that BPD patients turn to non-suicidal self-injury (NSSI) in order to regulate their affect (e.g., Claes & Vandereycken, 2007b). NSSI is defined as any socially unaccepted behaviour involving deliberate and direct injury to one's own body surface without suicidal intent (APA, 2013; Claes & Vandereycken, 2007a; Nock, 2009). It involves behaviours such as severe scratching, bruising, cutting, burning, and biting oneself. NSSI differs from suicidal behaviour with respect to prevalence, functionality, and underlying cognitions (Muehlenkamp, 2005). NSSI usually starts at age 12 to 14 (Jacobson & Gould, 2007), and its frequency declines with age (Zanarini et al., 2008).

Although different functions and frameworks regarding NSSI have been put forward (for an overview, see Gordon, Kwan, Minnich, & Carter, 2014), it is consistently found that patients who engage in NSSI report a strong decrease of negative affect and an increase in positive feelings shortly after NSSI (Chapman, Gratz, & Brown, 2006; Claes & Vandereycken, 2007b; Klonsky, 2007; Nock & Prinstein, 2004). These findings suggest that,

in the short term, NSSI is an effective coping strategy. In the long term, feelings of guilt and shame are likely to arise (e.g., Gratz, 2003; Leibenluft, Gardner, & Cowdry, 1987). This has a negative impact on one's self-concept (Jacobson & Gould, 2007; Kleindienst et al., 2008), which in turn is hypothesized to increase the risk to re-engage in NSSI (Chapman et al., 2006).

Accumulating research now highlights the importance of studying the variety of methods of NSSI, apart from the mere frequency of NSSI. NSSI diversity, i.e., the number of NSSI methods a person has used, and not the frequency of the NSSI, is found to be associated with different measures of suicidality, such as number of suicide attempts (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006; and see, Joiner, 2005, for an integrative framework), suicidal ideation (Lynam, Miller, Miller, Bornovalova, & Lejuez, 2011; Turner, Layden, Butler, & Chapman, 2013; Whitlock, Muehlenkamp, & Eckenrode, 2008), and suicide risk (Turner et al., 2013; Zlotnick, Donaldson, Spirito, & Pearlstein, 1997). Furthermore, NSSI diversity correlates positively with levels of impulsivity (Lynam et al., 2011; Turner et al., 2013), emotional dysregulation (Turner et al., 2013), severity of borderline personality disorder (BPD; Lynam et al., 2011), depression severity (Turner et al., 2013), disordered eating (Claes & Muehlenkamp, 2014; Whitlock et al., 2008), and anxiety symptoms (Klonsky & Olino, 2008). In sum, these findings suggest that NSSI diversity is a marker of severity of psychopathology (Jacobson & Gould, 2007).

Although NSSI is found in a variety of psychopathological conditions, it is traditionally considered to be a symptom of BPD (APA, 1994; Klonsky, 2007, 2011; Nock et al., 2006). Zanarini et al. (2008) reported that 89% of their BPD sample had engaged in repeated NSSI two years prior to testing. Additionally, 70% of them used multiple methods. Probably, the high prevalence of NSSI in BPD patients could, in part, be explained by BPD

patients' hypervigilance (Linehan, 1993; Niedtfeldt et al., 2010; Putnam & Silk, 2005; Stiglmayer et al., 2005). That is, BPD patients demonstrate a selection bias towards threatening stimuli, which makes them feel anxious and tensed. In order to cope with these feelings, they might more frequently turn to NSSI as an acute and effective affect-regulation strategy. Indeed, similar to non-BPD participants who engage in NSSI (e.g., Klonsky, 2011), BPD patients identify tension reduction as the most prominent motive of NSSI (Kleindienst et al., 2008). Additionally, findings of Chapman and Dixon-Gordon (2007) suggest that BPD patients are more likely to experience a positive emotional shift following NSSI than non-BPD participants, suggesting that BPD patients might profit more from the affect-regulating function of NSSI than non-BPD participants.

Another strategy that has been considered an affect-regulation strategy in BPD and other emotional disorders is overgeneral memory (OGM). OGM is a robust finding in depressed patients and patients suffering from posttraumatic stress disorder (for an overview, see: Moore & Zoellner, 2007; Williams et al., 2007). It refers to the tendency to retrieve categoric memories (i.e., memories referring to categories of events; e.g. , "Every Easter, when I bake a carrot cake"), instead of specific ones (i.e., memories referring to events that happened only once and did not take longer than one day; e.g., "Last Easter, when the carrot cake was burnt"), even when one is explicitly asked to retrieve specific memories. Memory specificity is generally measured with the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986), in which respondents are instructed to retrieve specific memories in response to cue words, like 'happy' or 'lonely'.

According to the CaR-FA-X model (Williams et al., 2007) and the Self-Memory System (SMS; Conway, 2005; Conway & Pleydell-Pearce, 2000; Conway, Singer, & Tagini, 2004), reduced memory specificity may be beneficial (and in some circumstances even

adaptive) in the short term: By not passing through to the final, most detailed stages of a search process, the reactivation of painful memories and associated affective states is avoided ('functional avoidance'). However, in the longer term, and when generalised towards other memories as well, OGM potentially contributes to the maintenance and/or onset of a depressed state or posttraumatic stress symptoms. Being inflexibly overgeneral hinders the integration of self-discrepant memories, therefore hindering adjustments of one's self-concept in the longer term (Conway et al., 2004). Furthermore, OGM in depressed and traumatised patients has been found to be associated with impaired social problem solving (e.g., Goddard, Dritschel, & Burton, 1996; Sutherland & Bryant, 2008), higher levels of rumination (e.g., Raes et al., 2005; Watkins & Teasdale, 2001), and reduced executive functioning (e.g., Dalgleish et al., 2007).

Grant et al. (2008) reported high comorbidity rates of major depressive disorder (MDD; 19.3% of BPD patients met MDD criteria during the last 12 months) and post-traumatic stress disorder (PTSD; 31.6% met criteria of PTSD during the last year) in BPD patients. Moreover, BPD patients suffer from an unstable sense of self ('identity confusion', DSM-IV, APA, 1994), disturbed executive resources (Maurex, 2009), and difficulties in social problem solving (e.g., Kremers, Spinhoven, Van der Does, & Van Dyck, 2006b; Maurex et al., 2010). Therefore, and given the assumed role of OGM as an affect-regulation strategy in psychopathology, we would expect that BPD patients would show problems in retrieving specific memories as well. However, in contrast to NSSI, OGM in BPD is only inconsistently found (see Van den Broeck, Claes, Pieters, Hermans, & Raes, in press). Whereas some studies suggest that OGM is associated with a diagnosis of BPD (Jones et al., 1999; Maurex et al., 2010; Reid & Startup, 2010), results of other studies do not support such an association (Arntz, Meeren, & Wessel, 2002; Kremers, Spinhoven, & van der Does, 2004;

Renneberg, Theobald, Nobs, & Weisbrod, 2005). Additionally, a couple of studies suggest that OGM in BPD is mainly associated with a co-morbid diagnosis of MDD (Artnz et al., 2002; Kremers et al., 2004; Spinhoven, Bockting, Schene, & Williams, 2007; Van den Broeck, Claes, Pieters, & Raes, 2012), although others do not find an association between depression and OGM in BPD patients (Maurex et al., 2010; Reid & Startup, 2010; Renneberg et al., 2005).

Previous studies thus suggest that both OGM and NSSI could serve an affect-regulating function in BPD. Yet, taken all together, findings regarding NSSI and OGM in BPD patients seem to suggest that BPD patients generally prefer to regulate their affect behaviourally (by NSSI), rather than cognitively (by OGM, for instance). However, the stability over time of one's preferences regarding affect-regulation strategies could be questioned, given that NSSI in BPD patients declines with age (Zanarini et al., 2008), and that OGM in BPD patients increases with age (e.g., Arntz et al., 2002; Spinhoven et al., 2007). This paper therefore primarily aims to study how these assumed affect-regulation strategies relate to each other. As mentioned above, both NSSI and OGM have important disadvantages in the longer term. The clinical implications of a relation between NSSI and OGM may thus include treating both NSSI and OGM at the same time. Furthermore, given that recent studies underline the importance of NSSI diversity apart from NSSI frequency, we also investigated the association between OGM and the number of NSSI methods reported.

To our knowledge, only three studies so far have investigated the relation between NSSI and OGM in BPD patients, but none have studied NSSI diversity in relation to OGM. Based on the widespread presence of 'parasuicidal acts' in BPD patients, and the early findings on OGM in BPD patients (Jones et al., 1999), Startup et al. (2001) hypothesized that both concepts would be positively related. However, contrary to their predictions, their

sample showed a strong and negative association between the frequency of parasuicidal acts and the number of overgeneral memories retrieved, $r = -.47$, $p < .05$. Startup et al. (2001) argued that OGM in BPD patients may be ineffective, therefore leading to the activation of distressing memories which, in turn, evoke affective dysregulation. This affective dysregulation is then controlled by parasuicidal acts. It should be noted that Startup et al. (2001) made no distinction between NSSI (without the intent to die) and suicidal behaviour. Similarly, the category of general memories they reported on was made up of categoric as well as extended memories (referring to an event that lasted longer than one day; e.g., "When I went abroad for a couple of days, last Easter"). In a later study, Renneberg et al. (2005) did not find any association between the frequency of self-mutilation (no definition given) and the number of specific memories retrieved in their sample of BPD patients. In a final study, Maurex et al. (2010) did not find an association either between the frequency of NSSI and the number of specific memories recalled in BPD patients. Despite these null-findings, we expected to find an inverse relationship in our study between the frequency (presence) of NSSI and OGM, as was demonstrated by Startup et al. (2001).

Method

Participants

Fifty five patients (8 males) participated in the study, all meeting DSM-IV BPD criteria (APA, 1994) according to the SCID-II interview (SCID-II, First, Gibbon, Spitzer, Williams, & Benjamin, 1997; Dutch translation by Weertman, Arntz, & Kerkhofs, 2000). Two female participants had incomplete protocols, and were deleted from the analyses. The remaining participants were between 18 and 51 years of age ($M = 29.47$; $SD = 8.45$). Most participants were single (62.26%). The majority (54.72%) held a high school diploma,

26.42% held a college level degree, and 9.43% held a master level degree. Participants were recruited in two Belgian psychiatric hospitals: University Psychiatric Centre KU Leuven, Campus Kortenberg (77.36%) and Psychiatric Hospital Duffel (22.64%). Most patients (79.25%) were inpatients, staying at a general psychiatric ward (47.62%), at a specialised unit treating BPD according to the principles of Dialectical Behavioural Therapy (DBT; Linehan, 1993; 35.71%), or at a unit specialised in the treatment of anxiety disorders (16.67%). The other patients (20.75%) followed day care treatment and outpatient emotional skill trainings, organised by the above-mentioned hospitals.

Instruments

Structured Clinical Interview for DSM-IV Disorders, Axis II (SCID-II, First, Gibbon, Spitzer, Williams, & Benjamin, 1997; Dutch translation by Weertman, Arntz, & Kerkhofs, 2000). The SCID-II is a semi-structured interview that systematically assesses DSM-IV Axis II disorders (APA, 1994). All SCID-II interviews were conducted by the first author, who is trained to use this instrument. The SCID-II items were scored on a 3-point scale ranging from *not applicable, applicable but not sufficiently present,* to *present*. Scores reflect the presence or absence of 12 personality disorders (all DSM-IV personality disorders plus depressive and passive-aggressive personality disorder). Inter-rater reliability of the SCID-II ranges from .90 to .98 for dimensional judgements and internal consistency ranges from .71 to .94 (Maffei et al., 1997).

Autobiographical Memory Test (AMT, Williams & Broadbent, 1986; Dutch version). In the AMT, respondents are presented with 18 cues (*happy, sad, safe, angry, interested, clumsy, successful, emotionally hurt, surprised, lonely, relaxed, guilty, proud, afraid, pleasant, cowardly, carefree,* and *lazy*) that are read aloud by the experimenter.

Participants are invited to retrieve specific memories. The definition of a specific autobiographical memory is explained by using an example. Three example cues are presented before the actual task to check whether the participants understood the assignment. Answers were immediately coded as 'specific', 'general categoric' (if the response refers to a category of events), 'general extended' (if the answer refers to an event that took longer than one day), 'no memory' (e.g., a semantic association in response of the cue), or 'same event' (whenever the retrieved memory was identical to a memory retrieved in response to a previous cue). If respondents first retrieved a general memory or a memory that had been retrieved earlier in response to another cue, they were prompted to search for specific memories again. If no memory had been found in 60 seconds, the next cue was presented and the answer was coded as 'omission'. We were especially interested in the number of general categoric memories retrieved. We further computed the number of specific memories retrieved, and, to correct for the number of omissions, the proportions of specific and general categoric memories[1]. AMT administration was audiotaped. Ten percent of the answers to AMT cues were re-coded by a second rater. Inter-rater reliability was .90.

Self-Injury Questionnaire-Treatment Related (SIQ-TR; Claes, Vandereycken, & Vertommen, 2007b). The SIQ-TR is a paper-and-pencil questionnaire on non-suicidal self-injurious behaviour. Respondents are asked to indicate how long ago (ranging from *a week ago* to *never*) they performed each of five types of NSSI (severe scratching, bruising, cutting, burning, and biting oneself). Additional questions on taxonomy (frequency, location on the

[1] To preserve maximum readability, we do not report the results for the proportional indices of specific (%S) and categoric (%GC) memories, unless they are different from the results using the plain number of specific (S) and categoric (GC) memories.

body, intensity of pain, planning) and functionality (affect scores before and after NSSI, motives of NSSI) were asked for each NSSI behaviour that was performed during the past month. The SIQ-TR thus allows to distinguish between participants who only recently (during the past month), ever (lifetime), or never have hurt themselves, as well as between patients who use one or more NSSI methods.

Procedure

This study was part of a larger study investigating autobiographical memory in BPD patients. Following oral and written informed consent, participants were asked to complete a battery of tests and questionnaires. Due to practical issues, data collection often took more than one session, but in most cases a respondent's protocol was completed within a three-week time span. We used a computerised version of the SIQ-TR, using the open source software Limesurvey. The study was approved by the ethical committees of the University of Leuven and the psychiatric hospitals where the study was conducted.

Results

Descriptive statistics

Most of our participants (69.81%) met more than five criteria needed for a BPD diagnosis (M = 6.38; SD = 1.18), with eight participants (15.09%) fulfilling at least eight criteria. Additionally, the majority of our participants (69.92%) had one or more co-morbid Axis II disorders (M = 1.28; range: 0–4). The following Axis II disorders were most often diagnosed besides BPD: Obsessive-Compulsive PD (n = 14), Antisocial PD (n = 13), Paranoid PD (n = 13), and Narcissistic PD (n = 11).

AMT scores did not significantly differ between in- and outpatients, but outpatients reported significantly fewer recent, but not lifetime, NSSI behaviours compared to inpatients, $M_{out} = 0.18$, $M_{in} = 1.05$, $F = 6.466$, $p = .014$. Men and women did not differ from each other with respect to their scores on the variables of interest (AMT, SIQ-TR). Similarly, the setting from which participants were recruited was not associated with different scores on these variables either.

Table 1 summarises the means, standard deviations and scoring ranges of all variables derived from the AMT. In general, 86.91% of all retrieved memories were specific memories. Table 2 shows the variables of interest derived from the SIQ-TR. Eighty three percent of our participants engaged in NSSI in the past, which matches previous data on the occurrence of NSSI in BPD patients (e.g., Zaki, Coifman, Rafaeli, Berenson, & Downey, 2013; Zanarini et al., 2008). Cutting is by far the most frequently used method of NSSI in our sample: Almost three-quarters of our participants (73.60%) cut themselves in the past. About one third of our sample (32.08%) cut themselves during the past month. Of those patients who engaged in NSSI, thirty-three respondents (75.00%) reported to have been engaged in more than one method of NSSI (M = 2.26; SD = 1.65), with seven patients (15.91%) reporting having used all five proposed methods of NSSI in the past.

The relationship between memory specificity and NSSI

Using Shapiro-Wilk statistics, we first investigated whether the AMT variables were normally distributed. This was not the case, all *p*s < .004. We tried different transformations, but none of them resulted in normally distributed variables. We therefore decided to perform Kruskal-Wallis H-tests, as a non-parametric test equivalent to an ANOVA, to investigate whether patients with a (recent or lifetime) history of NSSI differ from those without such a

history on their AMT performances. As reported in Table 3, we found no differences in memory specificity between patients with or without a (recent or lifetime) history of NSSI.

Investigating the association between NSSI diversity and OGM using Spearman rho correlations, we found that recent NSSI diversity was not related to memory specificity in our sample (Table 4, above the diagonal). However, the more NSSI diversity during lifetime reported, the less general categoric memories were retrieved, $\varrho = -.31$, $p < .05$. The positive association between the number of specific memories and lifetime NSSI diversity was not significant, $\varrho = .21$, $p = .14$. Still, we found that more different methods of lifetime NSSI behaviours related to higher proportions of specific memories, $\varrho = .28$, $p < .05$. These associations thus suggest that NSSI diversity and OGM are inversely associated.

It should be noted, however, that both specificity and lifetime NSSI diversity are significantly associated with age. The older patients are, the less specific they are with respect to memory retrieval, and the fewer different NSSI methods they report having used during lifetime. We therefore re-analysed our data while controlling for age (Table 4, below the diagonal). Interestingly, all associations between NSSI diversity and memory specificity then disappeared.

Discussion

This study examined the relationship between NSSI and OGM, two assumed affect-regulation strategies, in BPD. A first main finding is that OGM and NSSI diversity, and not presence of NSSI, are inversely related in our BPD patients. A second finding, qualifying the first, is that both OGM and NSSI diversity are associated with age and that their relation disappeares once age is controlled for. We will now discuss the relevancy of our findings, in

relation to previous studies, and in the light of the associations found with age. Subsequently, we will expand the associations between both OGM and NSSI and age.

Earlier studies on the association between OGM and NSSI in BPD patients exclusively focused on the *frequency* of NSSI behaviours (Maurex et al., 2010; Renneberg et al., 2010; Startup et al., 2001). In our sample, patients with and without NSSI did not differ from each other with respect to memory specificity. In addition to frequency of NSSI, we also examined OGM's relation with NSSI *diversity*. We found an inverse relation between these constructs, suggesting that NSSI diversity changes in function of OGM, and vice-versa. At first sight, this association suggests that the more a BPD patient regulates one's affect behaviourally (by *different* methods of NSSI), the lesser he uses cognitive means (as OGM) to deal with difficult affects. Our findings therefore, may in part contribute to the understanding of the inconsistent findings regarding OGM in BPD patients, who often engage in a variety of NSSI behaviours (Zanarini et al., 2008). Interestingly, though, this association disappeared when controlling for age, suggesting that age accounts for the association between lifetime NSSI diversity and OGM. One possible and fairly straightforward explanation for the observed correlation between NSSI diversity and OGM is that we have to do with a spurious correlation, caused by or resulting from the effect of a third variable, in this case age. However, our analyses also revealed that both memory specificity and lifetime NSSI diversity were negatively associated with age. This could indicate that affect-regulation skills in BPD patients change as these patients grow older, perhaps under the influence of therapy, or that they experience less pain in later stages of their lives (see also, Zanarini et al., 2008). Indeed, given that a disturbed affect-regulation is a central feature of BPD, long-term follow-up studies suggest that up to 75% of BPD patients lose the BPD diagnosis after 15 year (Paris, Brown, & Nowlis, 1987).

Given that the association between OGM and NSSI *diversity* has not previously been studied, and given the potential role of age in the relationship between NSSI diversity and OGM, our findings should be interpreted and discussed with caution. Some questions remain unanswered. For instance, what other explanations are there for the fact that we did not find any association between NSSI presence and OGM, than the potential role of age as a third variable in the relation between NSSI diversity and OGM? One hypothesis that we would like to put forward is, that the functionality of NSSI diversity, compared to NSSI frequency, more strongly resembles that of OGM. Yet, future research, including measures on the functionality of NSSI, is needed to clarify these relationships. By extension, further studies should also investigate the relation between other affect-regulation strategies (e.g., active coping, seeking support, etc.) and OGM.

Another question that remains unanswered is why someone uses a particular strategy (NSSI/OGM) at a particular moment. It has been previously hypothesized (e.g., Linehan, 1993; Startup et al., 2001) that cognitive affect-regulation strategies in (hypervigilant) BPD patients may often be ineffective in dealing with emotional turmoil. According to Mark Williams (personal communication, 25/2/2014), executive resources and the way they are allocated, may add to a better understanding of our findings.

Our analyses revealed that both memory specificity and lifetime NSSI diversity were negatively associated with age. Older respondents in our sample thus retrieve more categoric and less specific memories, and, remarkably, report to have engaged in less NSSI diversity. With respect to OGM's relation with age, our study replicates earlier findings (in BPD patients, e.g., Arntz et al., 2002; Spinhoven et al., 2007, but also in other clinical and non-clinical samples, e.g., Ros, Latorre, & Serrano, 2009; Sumner, Griffith, & Mineka, 2010).

However, despite these findings, the age effect is only rarely acknowledged, and researchers not always control for age when investigating OGM. With respect to NSSI, frequency is known to decline with age (e.g., Zanarini et al., 2008). Our findings also suggest that older respondents would engage in fewer different NSSI methods than younger ones. A first possibility is that our findings reflect the general tendency to become more overgeneral when growing older. Being less specific, older respondents may differentiate less between different NSSI methods. Second, older patients may become less accurate in remembering the different methods they have been engaged in in the past. Indeed, as Startup et al. (2001) noted, measuring NSSI in retrospect may confound accuracy. Third, we may have coincidentally selected younger participants who on average used more methods than the older respondents we included (selection bias). Or, fourth, given the association between NSSI diversity and suicide (see our Introduction), and the high rates of suicide in BPD patients (up to 10%; APA, 2001), a natural selection bias may have occurred, leaving only older participants with less variety in NSSI. Finally, it is possible that younger patients nowadays indeed use more NSSI methods compared to the older participants of our sample when they had the same age (cohort effect). Future longitudinal and prospective studies are recommended to clarify the negative association between age and NSSI diversity.

Our findings are not without limitations. First, by using the SIQ-TR, we only assessed a limited number of different NSSI methods, albeit the most common ones. Second, as mentioned already, NSSI was measured in retrospect, and therefore potentially not accurately. These shortcomings may be remediated in future studies by asking participants on a day-to-day basis during a consistent period of time to assess (and characterise) all NSSI methods they engage in. Given that we are the first researchers to find an association between

NSSI diversity and OGM in BPD patients, our findings need to be replicated, properly taking age into account.

In spite of the listed limitations, this study was the first to demonstrate an association between NSSI diversity and OGM in BPD patients, suggesting that, given the high prevalence of NSSI in BPD patients, BPD patients use NSSI (behaviour) over OGM (cognition) as an affect-regulation strategy. It is important to note, however, that the relation disappeared when we controlled for age. As mentioned, this could simply mean that the relation that we observed between NSSI diversity and OGM is a spurious finding, caused by the variable age. Alternatively, results may suggest that BPD patients achieve other, more adaptive affect-regulation strategies when they get older, or that the adoption of NSSI as an affect-regulation strategy has changed over cohorts.

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Table 1

Descriptive statistics of the Autobiographical Memory Test (AMT).

	M	SD	Range
N / % specific memories	14.68 / .87	2.38 / .13	7 – 18
N / % general categorical memories	.92 / .05	1.14 / .07	0 – 6
N / % general extended memories	.42 / .02	.77 / .04	0 – 4
N / % no memory retrievals	.49 / .03	.93 / .06	0 – 3
N / % same event retrievals	.40 / .02	.63 / .04	0 – 2
N omissions	1.09	1.30	0 – 6

Note. N = number of [type of answers on the Autobiographical Memory Test]; % = proportion of [type of answers on the Autobiographical Memory Test]. In computing %, we do not take into account omissions, e.g., % specific memories is = N specific memories / (18 – N omissions), with 18 being the total number of cues of the Autobiographical Memory Test.

Table 2

Frequencies and percentages of recent and lifetime NSSI in our sample, arranged by different NSSI methods, and by the number of different NSSI methods that were used during the period of interest, as measured by the Self-Injury Questionnaire – Treatment Related (SIQ-TR).

	Recent (during the last month)	Lifetime Prevalence
N / % Scratching	13 / 24.5	30 / 56.6
N / % Bruising	9 / 17.0	23 / 43.4
N / % Cutting	17 / 32.1	39 / 73.6
N / % Burning	3 / 5.7	15 / 28.3
N / % Biting	4 / 7.5	13 / 24.5
N / % Total NSSI	28 / 52.8	44 / 83.0
0	25 / 47.2	9 / 17.0
1	16 / 30.2	11 / 20.8
2	8 / 15.1	11 / 20.8
3	2 / 3.8	8 / 15.1
4	2 / 3.8	7 / 13.2
5	-	7 / 13.2

Note. NSSI = non-suicidal self-injury; N = number of [reported NSSI method]; % = percentage of respondents that reported [NSSI method].

Table 3

The mean numbers and proportions of specific and categoric memories retrieved by participants who reported lifetime or recent NSSI compared to those who did not.

	Recent NSSI (n = 28)	No recent NSSI (n = 25)	*p* (after conducting Kruskal-Wallis H-test)
N specific memories	15.07	14.24	.345
N categoric memories	.75	1.12	.365
% specific memories	.89	.84	.209
% categoric memories	.04	.07	.406
	Lifetime NSSI (n = 44)	No lifetime NSSI (n = 9)	*p* (after conducting Kruskal-Wallis H-test)
N specific memories	14.73	14.44	.962
N categoric memories	.84	1.33	.442
% specific memories	.87	.84	.703
% categoric memories	.05	.08	.598

Note. NSSI = non-suicidal self-injury; N = number of [specific/categoric] memories; % = proportion of [specific/categoric] memories. In computing %, we do not take into account omissions, e.g., % specific memories is = N specific memories / (18 – N omissions), with 18 being the total number of cues of the Autobiographical Memory Test.

Table 4

Spearman rho correlations between age, the number and proportions of specific and general categoric memories, and the number of different recent and lifetime NSSI methods. Spearman rho correlations below the diagonal are controlled for age.

	2	3	4	5	6	7
1. Age	-.35*	.36**	-.36**	.39**	-.25	-.43**
2. S	-	-.67**	.86**	-.74**	.16	.21
3. GC	-.63**	-	-.77**	.96**	-.16	-.31*
4. %S	.84**	-.74**	-	-.74**	.21	.28*
5. %GC	-.70**	.95**	-.70**	-	-.15	-.31*
6. N# NSSIs-R	.07	-.08	.13	-.06	-	.43**
7. N# NSSIs-LT	.06	-.18	.15	-.17	.44**	-

Note. NSSI = non-suicidal self-injury; S = number of specific memories retrieved during Autobiographical Memory Test administration; GC = number of general categoric memories retrieved; %S = proportion of specific memories; %GC = proportion of general categoric memories; N# NSSIs-R = number of different non-suicidal self-injury methods used during the last month; N# NSSIs-LT = number of different non-suicidal self-injurious methods used in one's lifetime.

* $p < .05$, ** $p < .01$.